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## SCIENCE:

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## The Horned Saurians of the Laramie Formation.

IN 1872 Professor Cope made known the remains of a very large dinosaurian reptile from the transition beds of Wyoming, whice he named *Agathaumas sylvestris*. The portion of the skeleton found "rested in the midst of vegetable debris, as sticks and stems, and was covered with many beautiful dicotyledonous leaves, which filled the interstices between the bones." The animal was discovered near Black Buttes Station, on the Union Pacific Railroad, fifty-two miles east of Green River, and near the Hallville Coal-Mines. Professor Cope succeeded in recovering sixteen vertebræ, including a perfect sacrum, with dorsals and caudals; both iliac and other pelvic bones, those of one side nearly perfect; some bones of the limbs, ribs, and other parts not determined. Professor Cope's description is thus:—

"The vertebræ are large. The dorsals are short, with vertically oval centra and small neural canal. The diapophyses originate well above the neural canal, diverge upwards, and are triangular in section. The neural spine is very much elevated, and the arch short antero-posteriorly. The zygapophyses are close together in both directions, those of the same aspect being separated by a narrow keel only. They do not project, but consist of articular surfaces cut into the solid spine. The latter is flat, and dilated distally. The articular faces are nearly plane, with a slight median prominence. The ribs have two articular surfaces, but I found no capitular pit on the dorsal centra.

"Elevation of centrum, 7.5 inches; width of the same, 5 inches 7.5 lines; length of same, 3 inches 8.5 lines: total elevation of a dorsal vertebra, 28 inches 3 lines. The sacrum consists of five vertebræ, the anterior centrum not depressed. They give out huge diapophyses, which are united by suture. They are themselves united distally in pairs, each pair supporting a longitudinal convex articular face for the ilium. Each pair encloses a perforation with the centra. The first diapophysis goes off from the point of junction of the first and second vertebræ; the second from the third only, and is more slender. The total length is 25 inches, and the width 30 inches. Its vertebræ are flat below, with latero-inferior angles. The last centrum gives off a simple diapophysis. . . . The iliac bone is extended antero-posteriorly. One extremity is thick and rather obtuse, but of little depth. There is a large protuberance above the acetabular sinus. The other extremity is dilated into a flat, thin plate of rather greater

length than the shorter extremity. The total length is about four feet, of which the acetabular sinus measures about 8.10 inches."

Professor Cope continues, "From the above description, it is evident that the animal of Black Buttes is a dinosaurian reptile, the characters of the sacral and iliac bones alone sufficing to demonstrate this point." It is pronounced the largest dinosaur described from North America.

This animal was described again and figured by Professor Cope in the "Vertebrata of the Cretaceous Formations," 1875: "On eight (and perhaps nine) vertebræ, anterior to the sacrum, there is no indication of the capitular articular facet for the rib [on the centrum]. This facet is found, as in *Crocodylia*, at or near the base of the elongate diapophyses. The centra are slightly concave posteriorly, and still less so on the anterior face, with gently convex margins. The neural canal is very small, and the neural arch short and quite distinct from the centrum, having scarcely any suture. The diapophyses are long and directed upwards. They are triangular in section."

The sacrales are then described, and the opinion is expressed that the tail is small: "The reduced and rather elongate form of the last sacral vertebra induces me to believe that this animal did not possess such large and short caudal vertebræ as are found in the genus *Hadrosaurus*, and that the tail was a less massive organ."

There cannot be any doubt that we have in *Agathaumas* a form widely different from any thing described before, clearly characterized by its peculiar sacrum and ilium.

Professor Marsh has created a new name, *Triceratops*, for this genus. That *Triceratops* is the same as *Agathaumas* will be admitted by everybody who will compare the figures published by Professor Cope, of the sacrum, the ilium, and the posterior dorsals, with the corresponding figures given by Professor Marsh. In the *American Journal of Science* (February, 1891) Professor Marsh makes this statement, "The posterior trunk vertebræ have also short, flat centra, but the diapophyses have faces for both the head and tubercle of the ribs, as in crocodiles, a feature not before seen in dinosaurs." Exactly this condition exists in *Agathaumas*, but also, as is well known, in *Iguanodon*. I think any further comment on the identity of *Agathaumas* and *Triceratops* is useless. Everybody can satisfy himself of this fact by comparing the figures of Professors Cope and Marsh.

I shall now show that *Ceratops* Marsh is the same as *Monoclonius* Cope.

In 1876 Professor Cope described a new, very remarkable dinosaur from the Fort Union beds of Montana, under the name of *Monoclonius crassus*.

"*Char. Gen.* — Teeth with obliquely truncate face and distinct root, which is grooved for the successional tooth on the front; no external cementum layer; caudal vertebræ biconcave, and brim narrow; fore-limbs large and massive. The teeth of this genus resemble those of *Hadrosaurus*, and, like them, are replaced from the front, — an arrangement which precludes the possibility of more than one series of teeth being in functional use at one time. The robust fore-limbs and elongate ilium distinguish *Monoclonius* [misprinted *Diclonius*] from *Hadrosaurus*. From *Trachyodon* it differs in the absence of the rough cementum layer on the back of the tooth.

"*Char. Specif.* — The faces of the teeth are acuminate oval in form, and are divided by an elevated keel, which is median above, but turns to one side at the base; margin crenate, the grooves extending more or less on the curves back, which is otherwise smooth; sacrum with ten vertebræ; the last centrum much compressed; the diapophyses extending horizontally from the neural arch above, and connected by a vertical lamina with the iliac supports; length, 27.33 inches. The bones of the limbs are robust, the hinder the longer, but not so much so as in some other genera. Length of femur, 22 inches; width proximally 7.4 inches, distally 6 inches. Length of tibia, 20 inches; greatest diameter proximally 8 inches, distally 7.25 inches. The three anterior dorsal vertebræ are co-ossified, and the first exhibits a deep cup for articulation with the preceding vertebra. The episternum is a T-shaped bone, thin, and keeled on the median line below. Length of transverse portion, 21 inches."